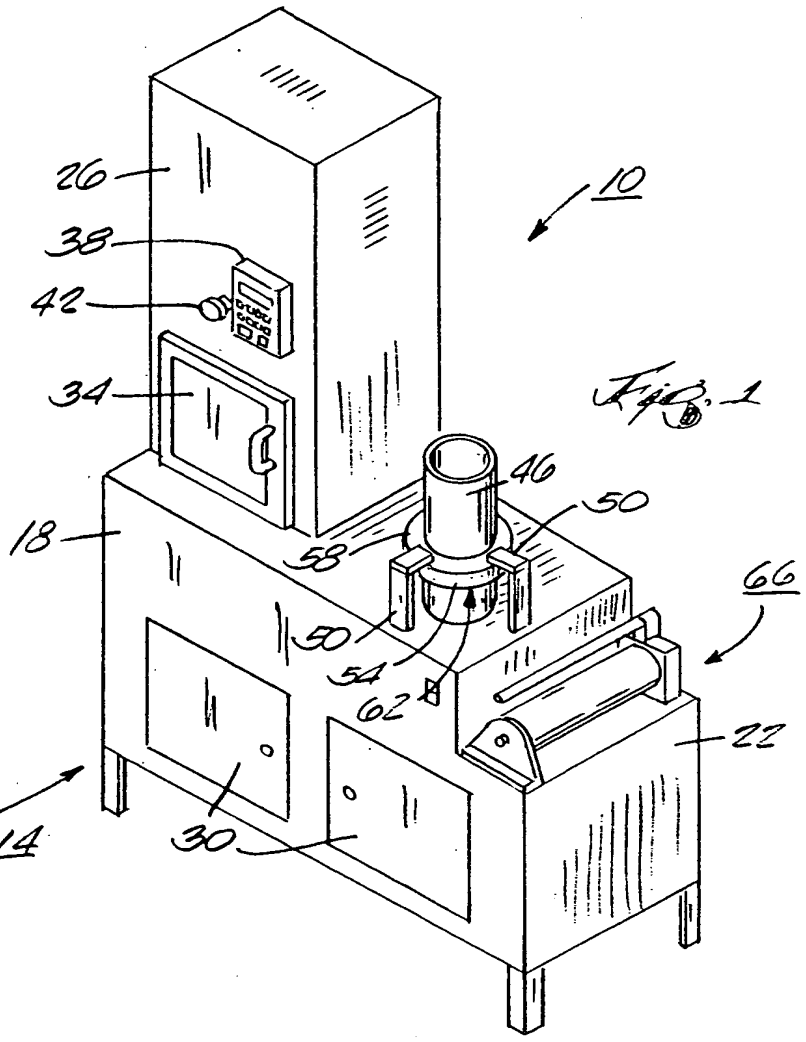

Fig. 1

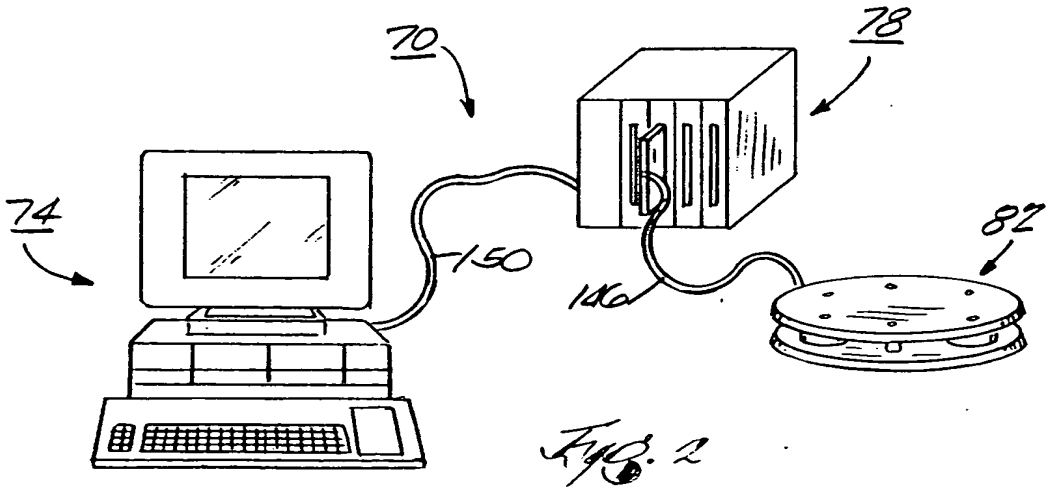

Fig. 2

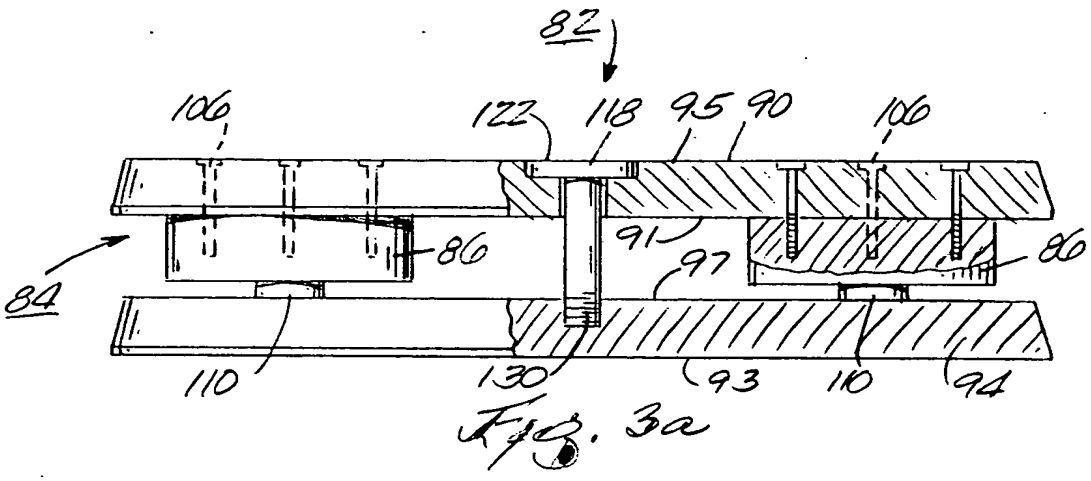
82
106
122
118
95
90
106
86
91
97
86
84
110
130
93
110
94

Fig. 3a

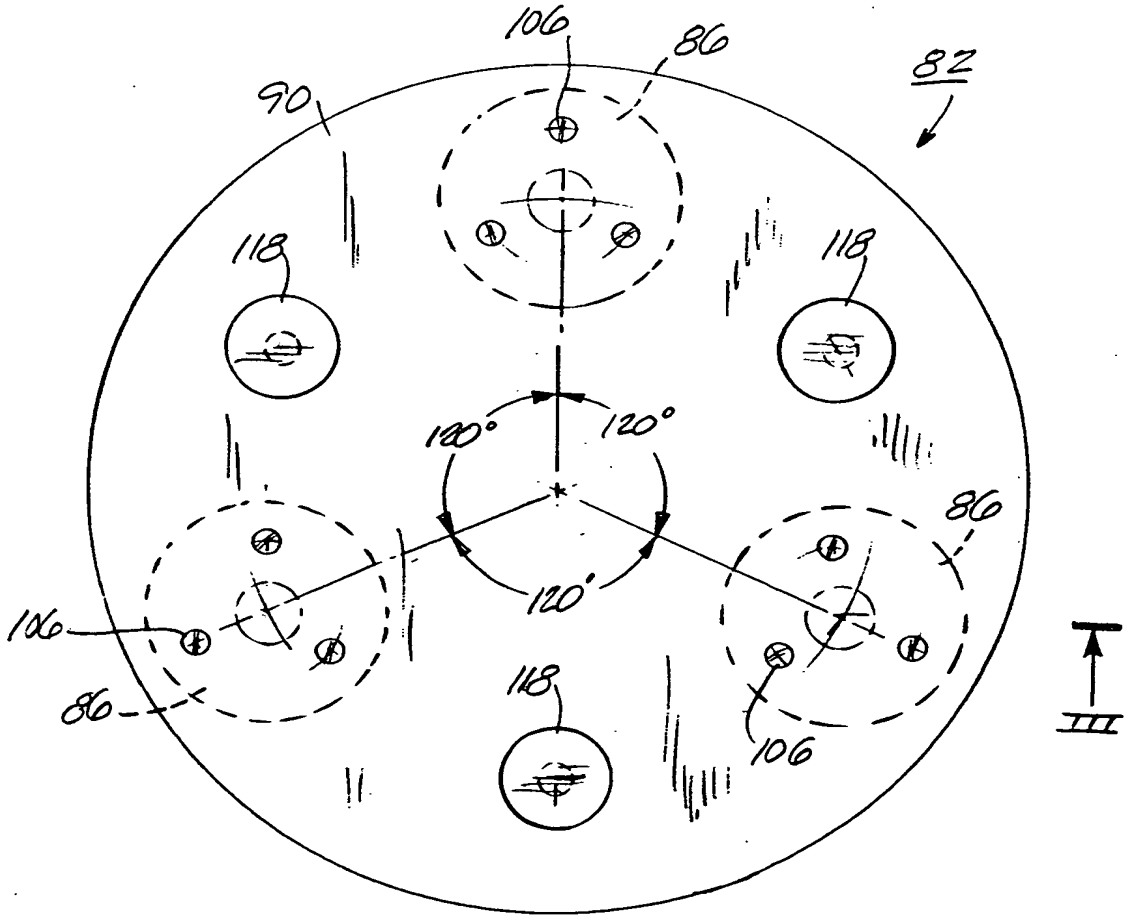
106
86
82
90
118
118
120°
120°
86
106
120°
118
86
106
III
III

Fig. 3b

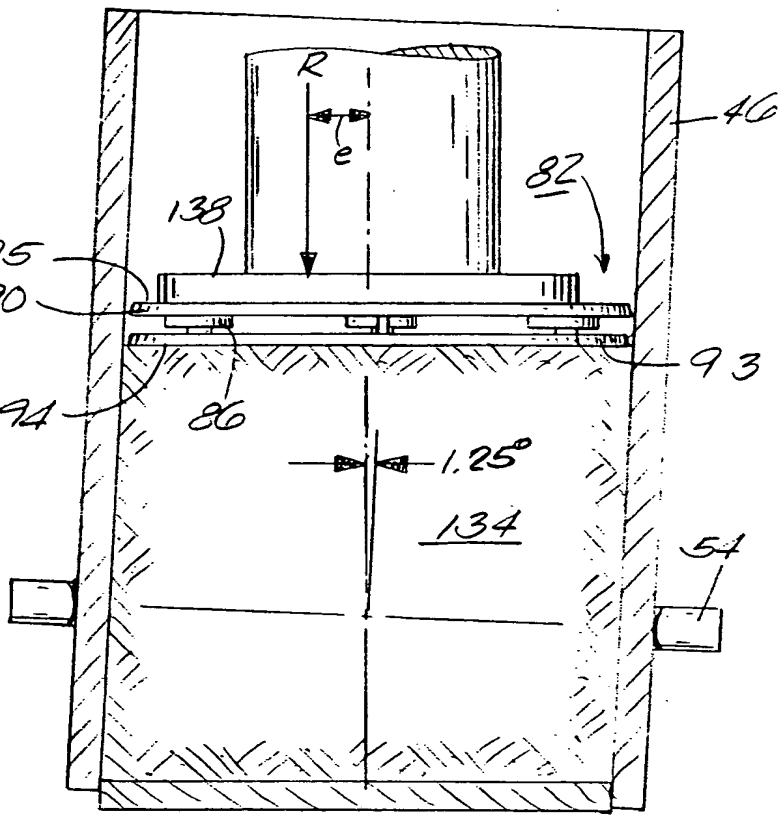
R
e
46
82
138
95
90
93
94
86
1.25°
134
54

Fig. 4

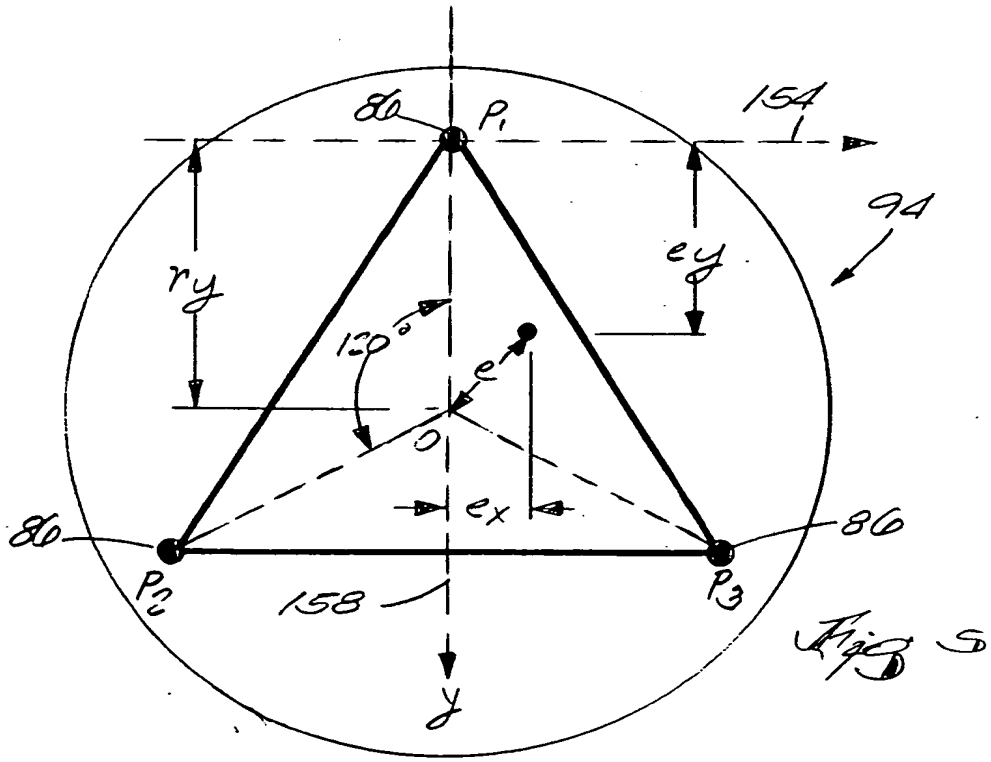
86
P1
154
94
ry
ey
120°
e
O
ex
86
86
P2
P3
158
y

Fig. 5

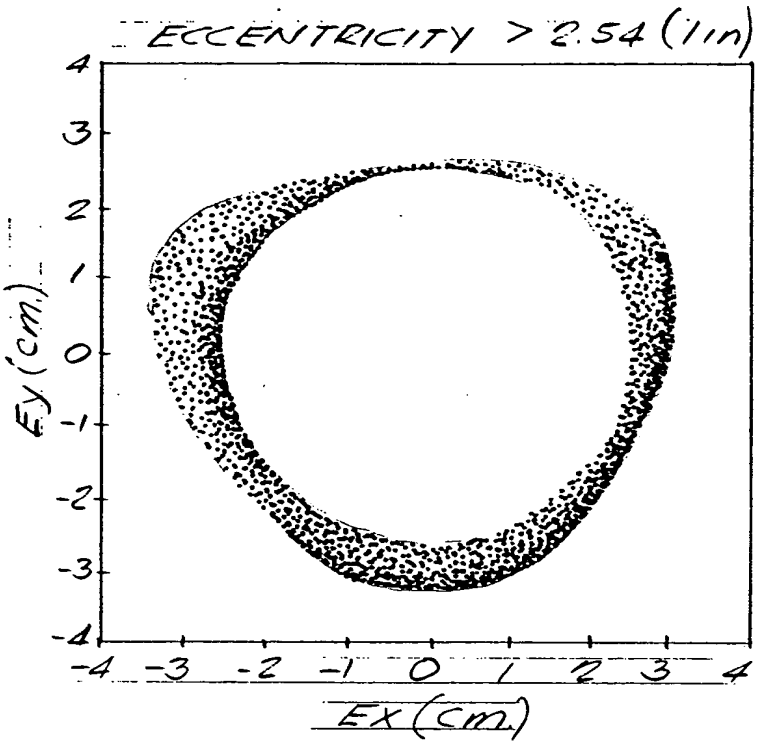
ECCENTRICITY > 2.54 (1in)
Ey (cm.)
4
3
2
1
0
-1
-2
-3
-4
-4 -3 -2 -1 0 1 2 3 4
EX (cm.)

Fig. 7b

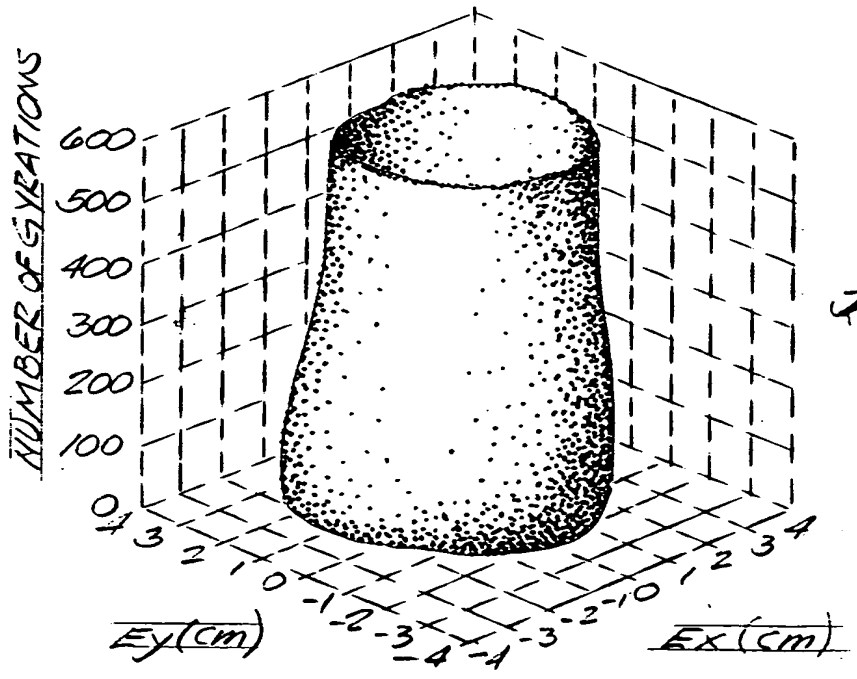
NUMBER OF GYRATIONS
600
500
400
300
200
100
0
Ey (cm)
Ex (cm)

Fig. 6a

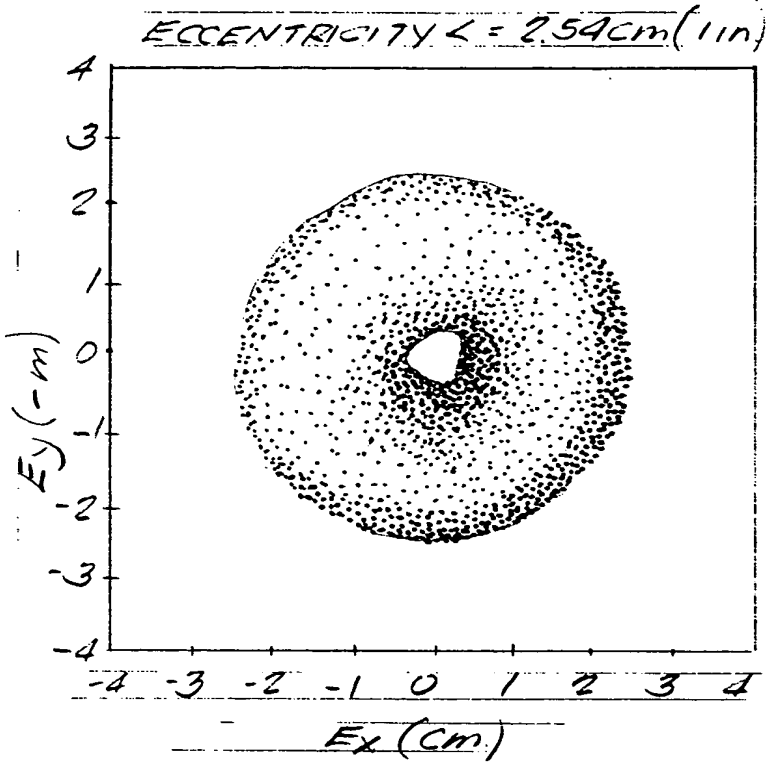
ECCENTRICITY ε = 2.54cm (1in)
Ey (-m)
4
3
2
1
0
-1
-2
-3
-4
-4 -3 -2 -1 0 1 2 3 4
Ex (cm.)

Fig. 7a

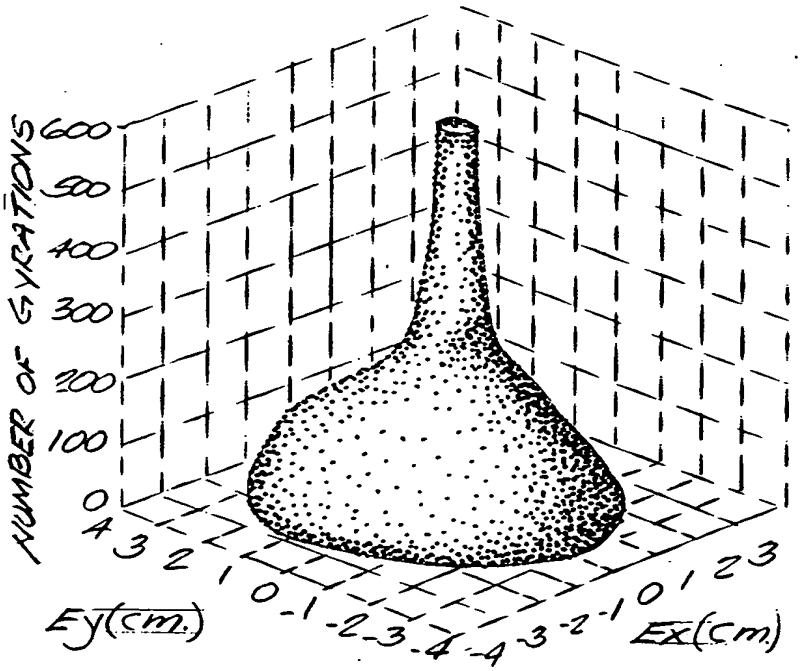
NUMBER OF GYRATIONS
600
500
400
300
200
100
0
Ey(cm.)
4 3 2 1 0 -1 -2 -3 -4
-4 -3 -2 -1 0 1 2 3
Ex(cm)

Fig. 6b

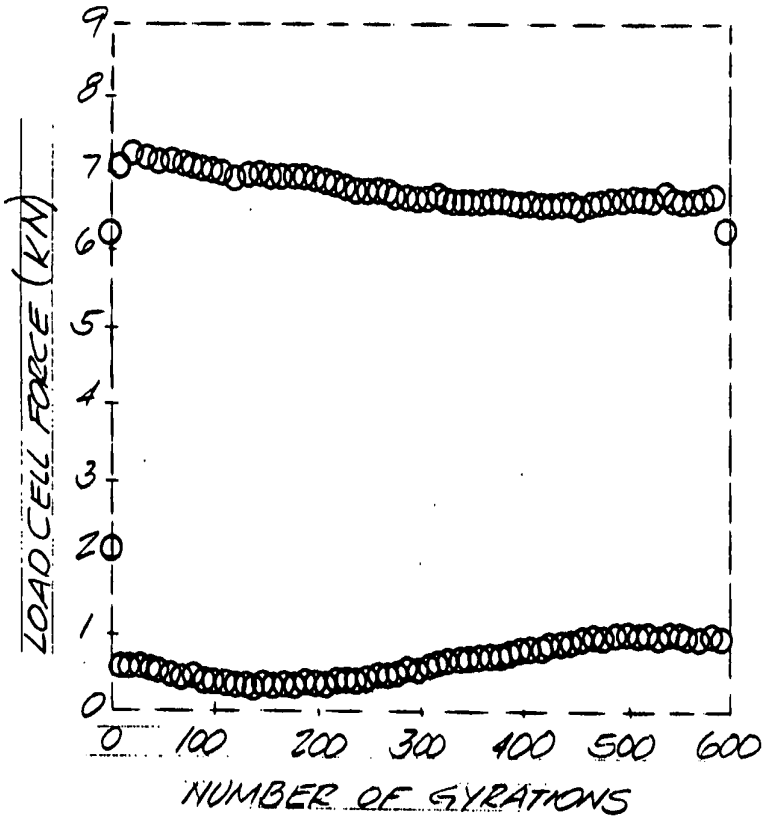
LOAD CELL FORCE (KN)
0
1
2
3
4
5
6
7
8
9
0
100
200
300
400
500
600
NUMBER OF GYRATIONS

Fig. 8a

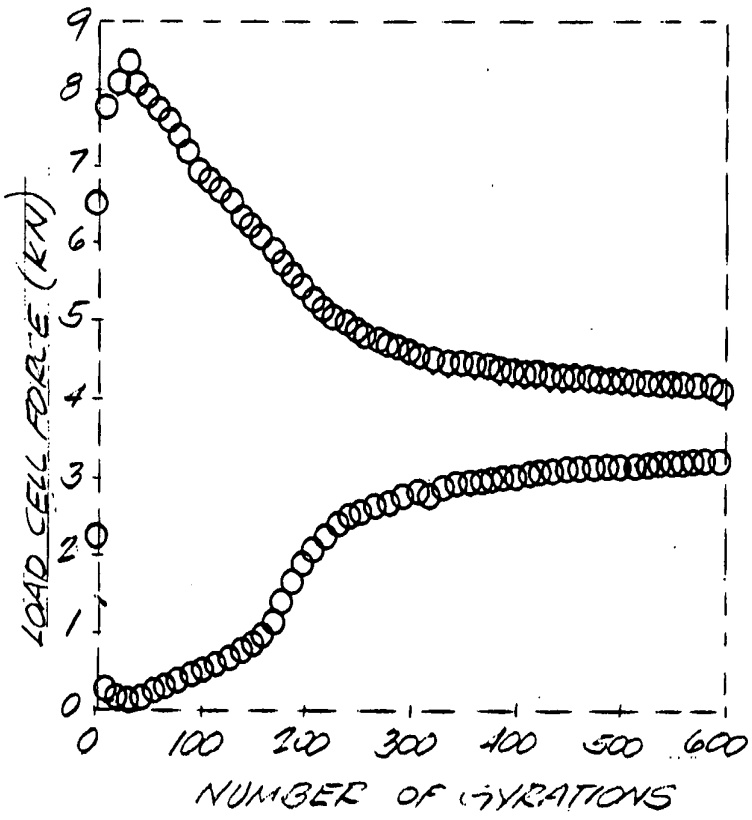
LOAD CELL FORCE (KN)
0
1
2
3
4
5
6
7
8
9
0
100
200
300
400
500
600
NUMBER OF GYRATIONS

Fig. 8b

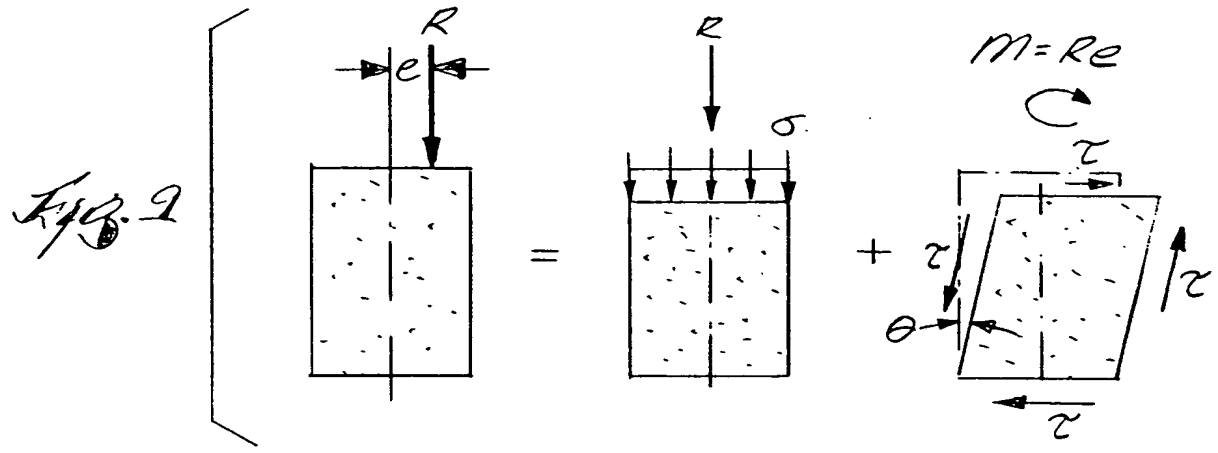
R
e
=
R
σ
M=Re
τ
+ τ
θ
τ
τ

Fig. 9

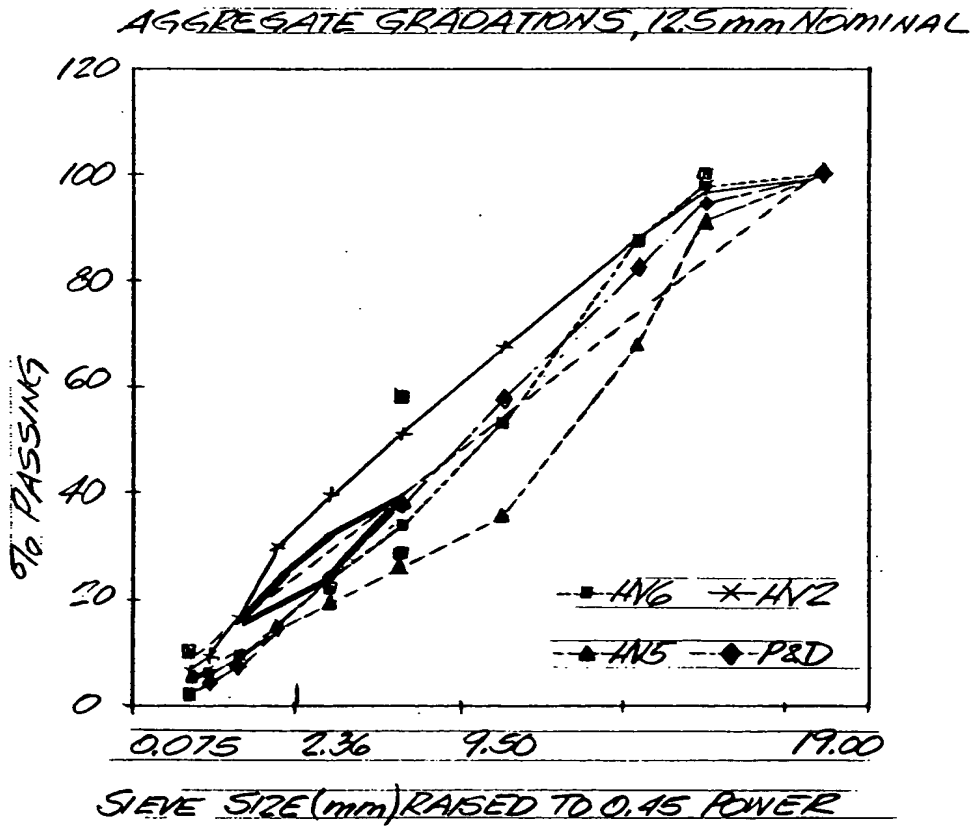
AGGREGATE GRADATIONS, 12.5mm NOMINAL
% PASSING
120
100
80
60
40
20
0
0.075
2.36
9.50
19.00
SIEVE SIZE (mm) RAISED TO 0.45 POWER
HV6
HV2
HV5
P&D

Fig. 10

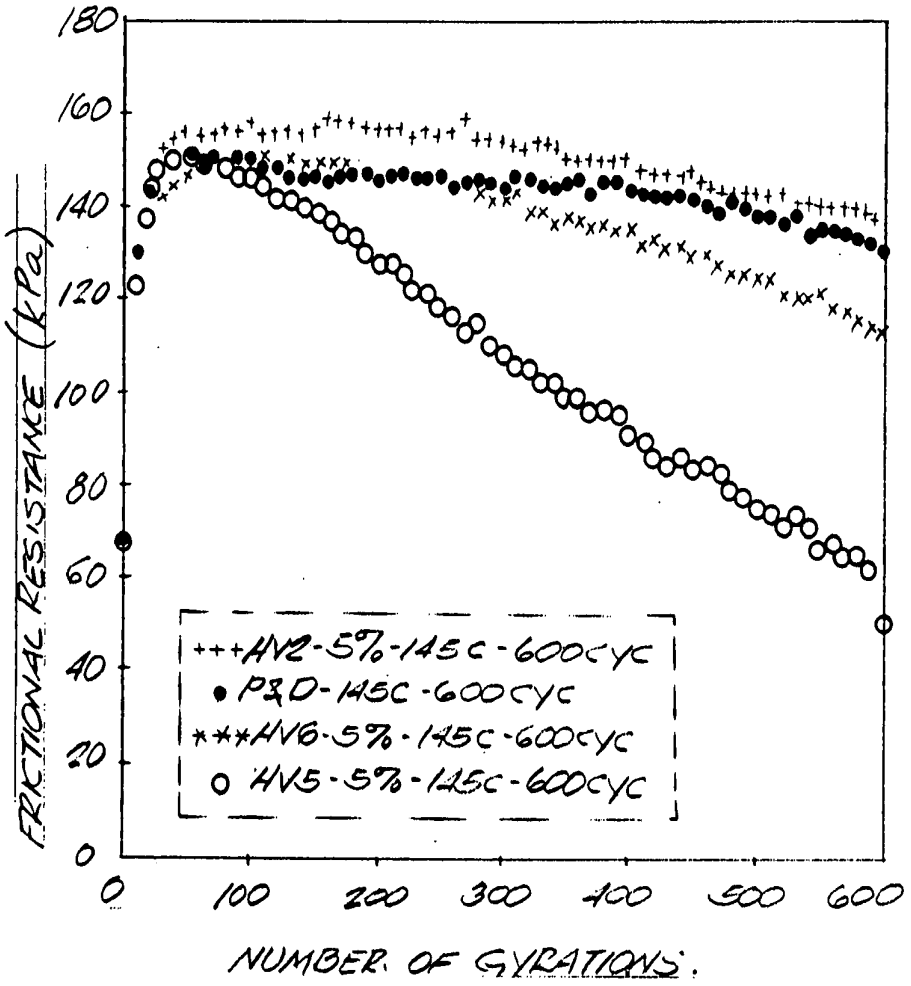
FRICTIONAL RESISTANCE (KPa)
180
160
140
120
100
80
60
40
20
0
0
100
200
300
400
500
600
NUMBER OF GYRATIONS.
+++HV2-5%-145C-600CYC
• P3D-145C-600CYC
***HV6-5%-145C-600CYC
o HV5-5%-145C-600CYC

Fig. 11

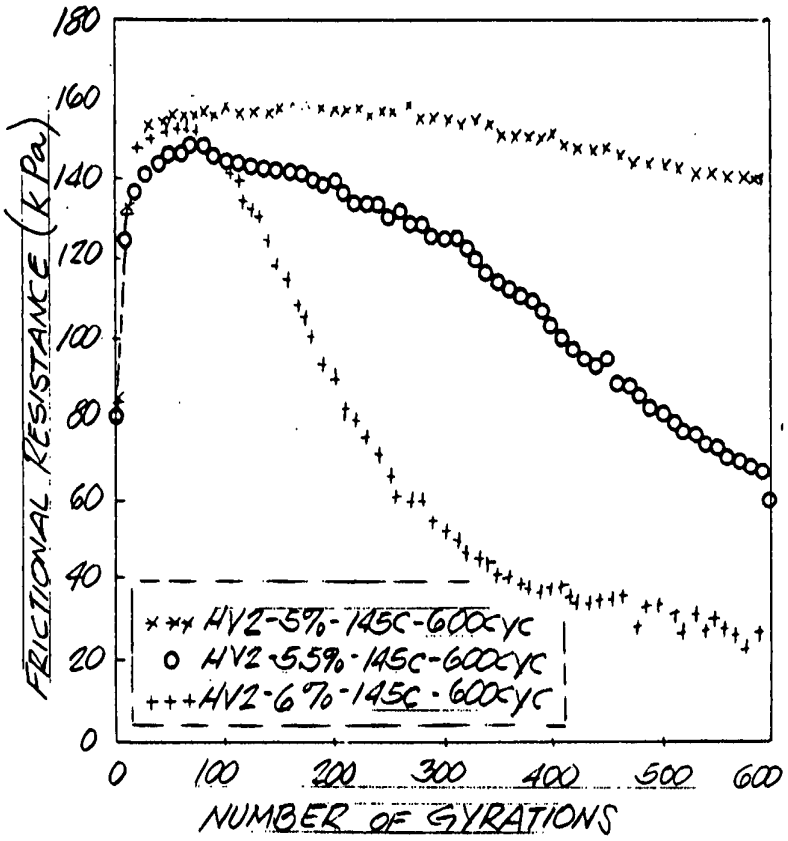

Fig. 12a

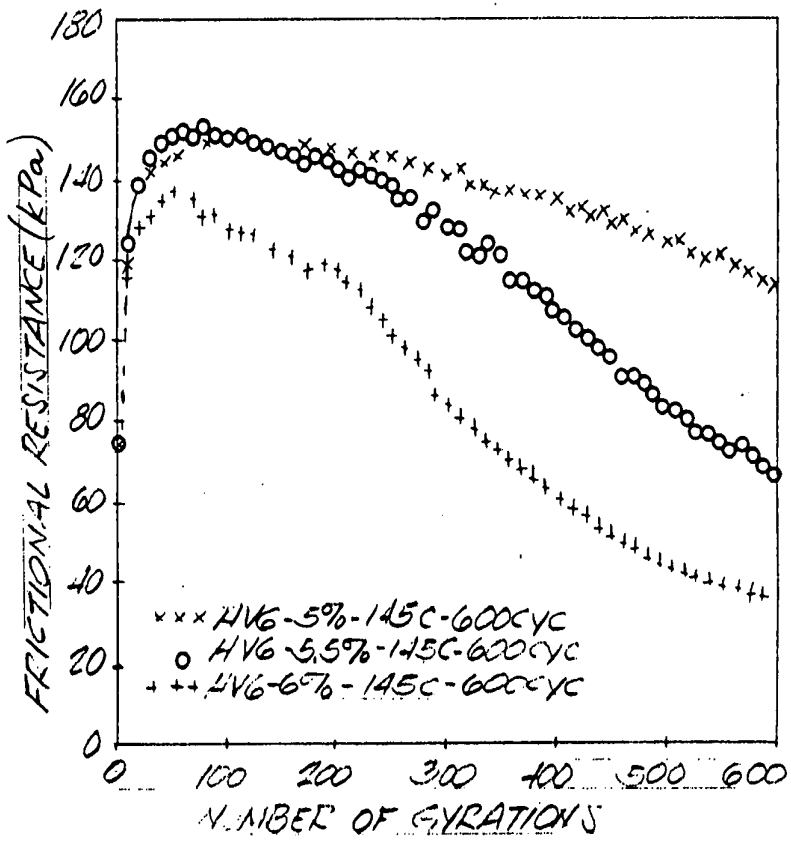

Fig. 12b

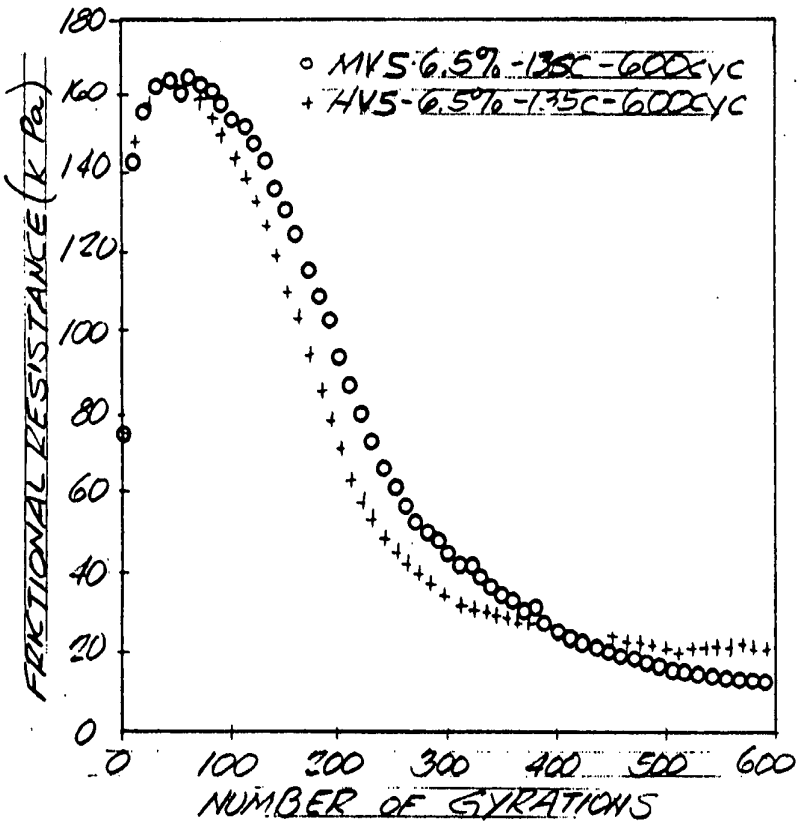

Fig. 13b

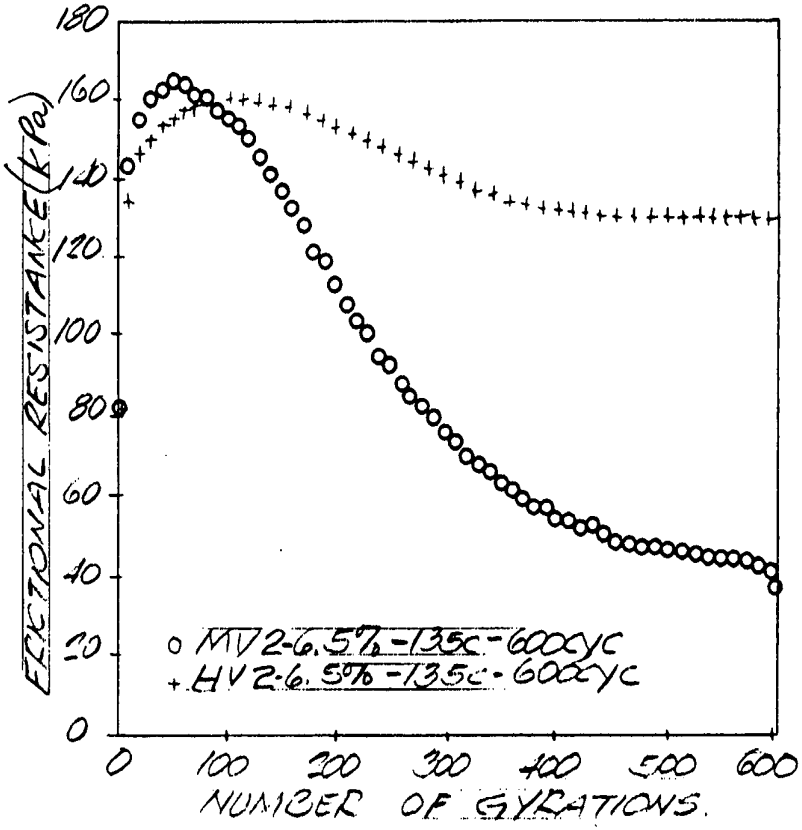

Fig. 13a

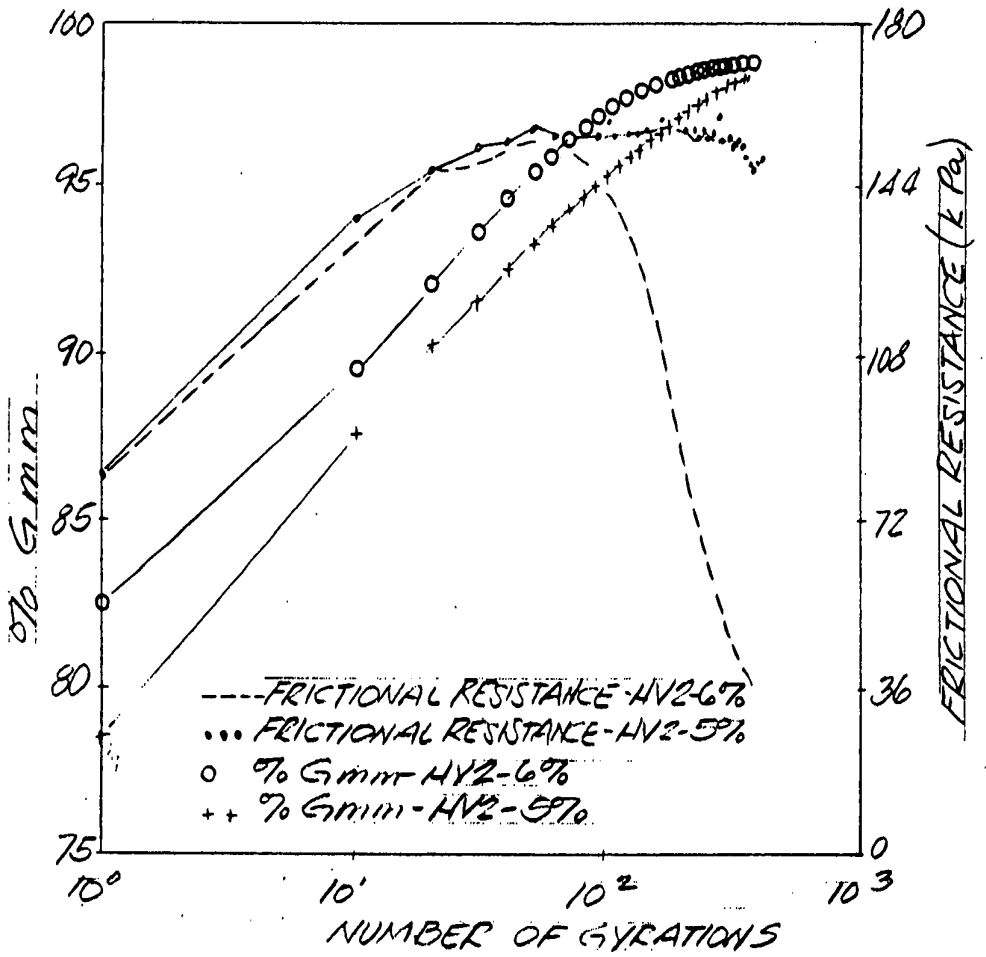
100
95
90
85
80
75
% Gmm
180
144
108
72
36
0
FRICTIONAL RESISTANCE (k Pa)
10°
10¹
10²
10³
NUMBER OF GYRATIONS
----FRICTIONAL RESISTANCE-HV2-6%
••• FRICTIONAL RESISTANCE-HV2-5%
o % Gmm-HV2-6%
++ % Gmm-HV2-5%

Fig. 14

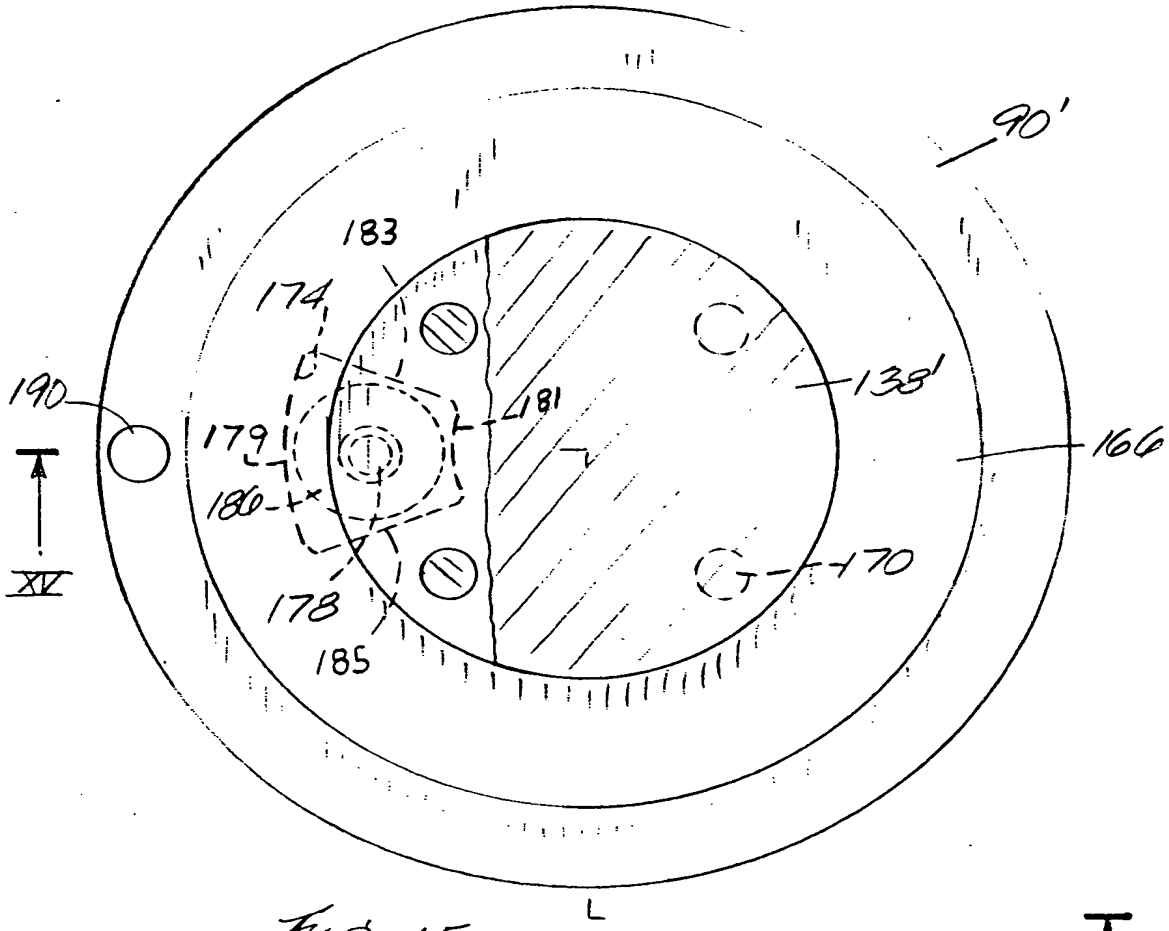

Fig. 15

XV

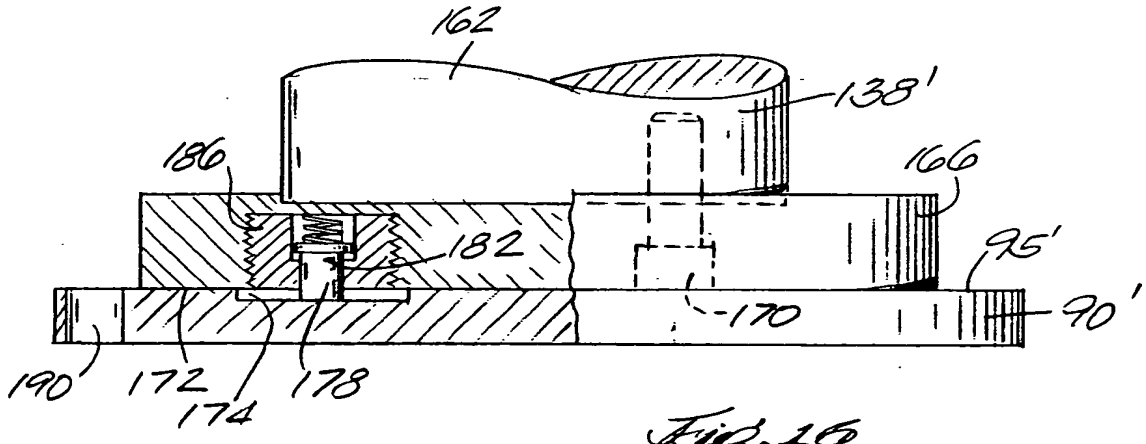

Fig. 16